

## **REMARKS/ARGUMENTS**

In view of the following remarks and arguments, Applicants believe the pending application is in condition for allowance.

### **I. Status of the Claims**

Claims 11-42 are pending and are presented herein as a courtesy to the Examiner. No amendment to the claims has been made.

### **II. Amendments to the Specification**

The specification has been amended to correct typographical errors.

Support for the first amendment (“~~europium bromide~~ lead iodide”) is found in the specification on p. 28, lines 6-7 (“lead iodide”) and on p. 29, lines 7, 9, 11-12, and 13 (“lead iodide”).

Support for the second amendment (“~~europium~~ cesium iodide”) is found in the specification on p. 34, lines 23 and 25 (“cesium iodide”), on p. 35, lines 9 and 13 and Table 1 (“cesium iodide”), and on p. 36, lines 18 and 22 (“cesium iodide”).

Support for the third amendment (“increasing the proportion of ~~europium bromide~~ cesium iodide vapor deposited from 0 to 40% by weight”) is found in the specification on p. 35, Table 1, which shows the proportion of cesium iodide to be between 0 and 40 % by weight but that of europium bromide to be between 12.5 and 29 % by weight.

No new matter is added by the amendments.

**III. Acknowledgment of Allowable Subject Matter**

Applicants thank the Examiner for the acknowledgment of allowable subject matter in claims 35-38.

**IV. Claim Objections**

Claims 35-38 are objected to as being dependent upon rejected base claims but would be allowable if rewritten in independent form including all the elements of the base claims and any intervening claims.

Applicants respectfully submit that, as argued below, the references cited by the Examiner do not support rejection of any of the base or intervening claims and respectfully request that the objections thereof be withdrawn.

**Va. Claim Rejections — 35 U.S.C. § 102(b)**

Claims 11-30 and 39-42 are rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 5,783,292 to Tokito et al. (“Tokito”). The Examiner contends that Tokito discloses every element recited in the claims. Applicants respectfully traverse the rejections.

Claim 11 recites “an inorganic compound dispersed in at least one of the organic compound layers, thereby changing the luminescent color.” Applicants respectfully submit that Tokito does not disclose either the “inorganic dispersed in organic” element or the “change luminescent color” element of claim 11.

Tokito discloses an emissive layer containing “an organic compound dispersed uniformly in an inorganic compound, or a superlattice structure made of an organic compound and an inorganic compound.” Tokito, Abstract, lines 8-11. But Tokito does not disclose an inorganic compound dispersed in an organic compound as recited in claim 11. Regarding the dispersion structures, Tokito further discloses that “the distance between particles of the organic compound dispersed in the inorganic compound is not larger than 50 Å.” Tokito, column 4, lines 12-14. Regarding the superlattice structures, Tokito further discloses that “organic compound films and inorganic compound films are alternately disposed.” Tokito, column 5, lines 57-59.

None of the structures disclosed by Tokito teaches or suggests a structure in which an inorganic compound is dispersed in an organic compound. Thus, Tokito does not disclose the “inorganic dispersed in organic” element of claim 11.

In addition, Tokito does not teach or suggest that a change in luminescent color is effected by forming the dispersion. In fact, Tokito discloses the opposite:

The fabricated devices [taught by Tokito] emitted yellow light when a driving D.C. voltage over approximately 8 V was applied to the devices. A spectrum of the yellow light approximately corresponded to that of the fluorescence of perylene. This result

indicates that the composite thin film of magnesium fluoride [an inorganic compound] and perylene [an organic compound] functions as an emission layer 14 like the perylene film in the conventional devices.

Tokito, column 12, lines 42-49 (emphasis added). Thus, Tokito also does not disclose the “change luminescent color” element of claim 11 since Tokito’s film did not change the color of the emitted light upon dispersion formation: it emitted the same color as the prior art devices.

At least for the reasons stated above, Tokito does not anticipate claim 11. Applicants respectfully request that the rejection thereof be withdrawn.

Claims 12-30 and 39-42 depend directly or indirectly from claim 11. Thus, at least for the same reasons as stated above, Tokito does not anticipate claims 12-30 and 39-42. Applicants respectfully request that the rejections thereof be withdrawn.

**Vb. Claim Rejections — 35 U.S.C. §§ 102(b) & 103(a)**

Claims 11-22 and 27-34 are rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over U.S. Patent No. 5,871,579 to Liang et al. (“Liang”). The Examiner contends that Liang discloses every element recited in the claims or, in the alternative, that Liang in view of the Examiner’s statements of the ordinary skill in the art renders the claims obvious. Applicants respectfully traverse the rejections on either ground.

Claim 11 recites “an inorganic compound dispersed in at least one of the organic compound layers.” Liang only discloses perovskites containing organic and inorganic moieties. Liang does

not disclose a mixed dispersion of an inorganic compound in an organic compound. Liang makes it clear that the term “perovskite” refers to a crystalline structure of a single compound, not a mixed dispersion of two or more compounds. *See, e.g.*, Liang, column 7, lines 51-52 (“the formed perovskite film is well-crystallized”); column 9, lines 9-12 (“[t]he structure of the layered perovskites is highly anisotropic and crystal growth tends to occur most easily along the plane of the perovskite sheets and more slowly along the perpendicular direction to the sheets”); column 11, lines 27-31 (“[t]he fact that thin films of the layered perovskites made by the dipping technique have strong photoluminescence indicates that they are well-crystallized and have few non-radiative decay centers for the excitons”).

Thus, a  $\text{PbI}_2$  crystal, for example, would not disclose a mixed dispersion of solid Pb in solid  $\text{I}_2$  or solid  $\text{I}_2$  in solid Pb. Likewise, Liang’s organic-inorganic perovskites do not disclose “an inorganic compound dispersed in at least one of the organic compound layers” recited in claim 11.

At least for this reason, Liang does not anticipate claim 11. Applicants respectfully request that the rejection of the claim on anticipation ground be withdrawn.

Claims 12-22 and 27-34 depend directly or indirectly from claim 11. Thus, at least for the same reason as stated above, Liang does not anticipate claims 12-22 and 27-34. Applicants respectfully request that the rejections of the claims on anticipation ground be withdrawn.

Claim 11 is rejected in the alternative on obviousness ground in case Liang “is not sufficient to anticipate a direct current electroluminescent device with the disclosed perovskite layer.” Office Action dated May 25, 2006, page 3, lines 9-10. As discussed above, however, neither Liang nor the

Examiner's statements of the ordinary skill in the art teach or suggest the predicate "mixed dispersion" element.

At least for this reason, Liang in view of the Examiner's statements of ordinary skill in the art does not render claim 11 obvious. Applicants respectfully request that the rejection of the claim on obviousness ground be withdrawn.

Claims 12-22 and 27-34 depend directly or indirectly from claim 11. Thus, at least for the same reason as stated above, Liang in view of the Examiner's statements of the ordinary skill in the art does not render claims 12-22 and 27-34 obvious. Applicants respectfully request that the rejections of the claims on obviousness ground be withdrawn.

**Vc. Claim Rejections — 35 U.S.C. § 102(e)**

Claims 11-22 are rejected under 35 U.S.C. § 102(e) as anticipated by U.S. Patent Application Publication No. 2002 /0101154 A1 to Seo et al. ("Seo"). The Examiner contends that Seo discloses every element recited in the claims. Applicants respectfully traverse the rejections of these claims.

Applicants respectfully traverse the rejections of claims 11-18 by submitting a Declaration under 37 C.F.R. § 1.131 along with documentary evidence in the form of Exhibits A though D. The Declaration, signed by both inventors, states that the inventors completed and reduced to practice the invention as embodied in claims 11-18 prior to the earliest filing date of Seo.

Exhibits C and D of the Declaration are in-house documents written in Japanese, the English translations of which are provided as Exhibits A and B, respectively. The first and second experiments disclosed in Exhibit C correspond to EXAMPLES 9 and 7, respectively, disclosed in the specification of the present application. The first figure presented in Exhibit C (“EL Intensity vs. Wavelength”) corresponds partially to Figs. 18 and 20 of the specification. The first and second experiments disclosed in Exhibit D correspond to EXAMPLES 2 and 1, respectively, disclosed in the specification. And the first three figures presented in Exhibit D correspond, at least partially, to Figs. 2, 3, and 5, respectively, of the specification.

As such, Exhibits C and D disclose the elements recited in claim 11: a plurality of organic compound layers disposed between an anode and a cathode; and an inorganic compound dispersed in one of the organic compound layers, thereby changing the luminescent color. Therefore, Applicants respectfully submit that they completed the invention as embodied in claim 11 prior to the effective date of Seo, thus antedating this reference such that it is not prior art as to claim 11. Accordingly, claim 11 is allowable.

Claim 12 depends from claim 11. Exhibits C and D further disclose the additional element recited in claim 12: that luminescence of the inorganic compound is achieved by a direct current voltage. Therefore, Applicants respectfully submit that they completed the invention as embodied in claim 12 prior to the effective date of Seo, thus antedating this reference such that it is not prior art as to claim 12. Accordingly, claim 12 is allowable.

Claims 13 and 14 depend from claims 11 and 12, respectively. Exhibits C and D further disclose the additional element recited in claims 13 and 14: that a part of the inorganic compound is replaced to change the luminescent color. Therefore, Applicants respectfully submit that they completed the invention as embodied in claims 13 and 14 prior to the effective date of Seo, thus antedating this reference such that it is not prior art as to claims 13 and 14. Accordingly, claims 13 and 14 are allowable.

Claims 15, 16, 17, and 18 depend from claims 11, 12, 13, and 14, respectively. Exhibits C and D further disclose the additional element recited in claims 15-18: that the inorganic compound is a metallic compound. Therefore, Applicants respectfully submit that they completed the invention as embodied in claims 15-18 prior to the effective date of Seo, thus antedating this reference such that it is not prior art as to claims 15-18. Accordingly, claims 15-18 are allowable.

Accordingly, Exhibits C and D (as translated in Exhibits A and B) disclose the invention as embodied in claims 11-18 and show that Applicants were in full possession of the invention as embodied in claims 11-18 before the filing date of Seo. Therefore, Applicants respectfully request that the 35 U.S.C. § 102(e) rejections of claims 11-18 based on Seo be withdrawn.

Furthermore, Applicants disagree that Seo discloses every element recited in claims 11-22. Claim 11 recites “an inorganic compound dispersed in at least one of the organic compound layers.” The Examiner states that Seo discloses this element because Seo “teaches an electroluminescent device comprising a mixed layer of organic compound CBP [4,4’-bis(carbazol-9-yl)biphenyl] and platinum complex ‘PtOEP’.” Office Action dated May 25, 2006, page 3, lines 14-15. Seo further

explains that PtOEP stands for “2,3,7,8,12,13,17,18-octaethyl-21H, 23H-porphyrin-platinum.” Seo, para. [0108]. The Examiner implicitly contends that PtOEP is an inorganic compound.

Contrary to the Examiner’s contention, Applicants have described organometallic compounds such as PtOEP to be among organic compounds, not inorganic compounds, in the specification. *See, e.g.*, Specification, page 4, lines 6-7 (“organic dyes and fluorescence dyes such as organometallic complexes”); page 10, lines 11-14 (“[e]xamples of the organic material layer having electron transport properties include . . . alumiquinolinol complexes”); page 12, lines 8-11 (“examples of the organic compound include . . . aluminum-quinolinol complexes and derivatives thereof”). An alumiquinolinol, or equivalently, aluminum-quinolinol complex  $[Al(C_9H_6NO)_3]$ , like PtOEP, is an organometallic compound.<sup>1</sup> Under Applicants’ usage of the term “organic,” they are both organic compounds.

Thus, Seo does not disclose an inorganic compound dispersed in an organic compound as recited in claim 11. At least for this reason, Seo does not anticipate claim 11. Applicants respectfully request that the rejection thereof be withdrawn.

Claims 12-22 depend directly or indirectly from claim 11. Thus, at least for the same reason as stated above, Seo does not anticipate claims 12-22. Applicants respectfully request that the rejections thereof be withdrawn.

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<sup>1</sup> For ease of reference, Tokito conveniently provides the chemical structure of an aluminum-quinolinol complex as Formula 3 in column 10.

**Vd. Claim Rejections — 35 U.S.C. § 103(a)**

Claims 19-26 and 39-42 are rejected under 35 U.S.C. § 103(a) as obvious over Tokito in view of the Examiner's statement of the ordinary skill in the art. Applicants respectfully traverse the rejections.

Claims 19-26 and 39-42 recite, due to their dependency from claim 11, "an inorganic compound dispersed in at least one of the organic compound layers, thereby changing the luminescent color." Rejections of these claims are asserted as an alternative to the anticipation-based rejections discussed above in case the metal fluorides disclosed by Tokito are "not sufficient to anticipate an alkaline earth metal fluoride, rare earth fluoride, transition metal fluoride or a combination of these as the inorganic material." Office Action dated May 25, 2006, page 3, lines 19-21.

The Examiner, in rejecting the claims, implicitly contends that Tokito discloses the predicate "inorganic dispersed in organic" and "change luminescent color" elements recited in claims 19-26 and 39-42. However, as discussed above in relation to the anticipation-based rejection of claim 11 in light of Tokito, Tokito neither discloses these elements nor suggests them to one of ordinary skill in the art.

At least for this reason, Tokito in view of the Examiner's statement of the ordinary skill in the art does not render claims 19-26 and 39-42 obvious. Applicants respectfully request that the rejections thereof be withdrawn.

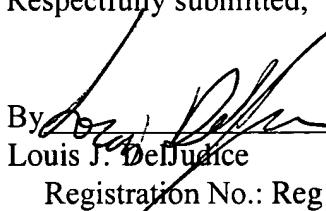
**CONCLUSION**

In view of the foregoing it is believed that claims 11-42 are in immediate condition for allowance and it is respectfully requested that the application be reconsidered and that all pending claims be allowed and the case passed to issue.

If there are any other issues remaining which the Examiner believes could be resolved through a Supplemental Response or an Examiner's Amendment, the Examiner is respectfully requested to contact the undersigned at the telephone number indicated below.

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Respectfully submitted,

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